Heating & Air Conditioning
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# RHA**B*A

## Remote Heat Pump

# Installation Instructions

*Affix this manual, Specification Sheet and Users Information Manual adjacent to the unit.*

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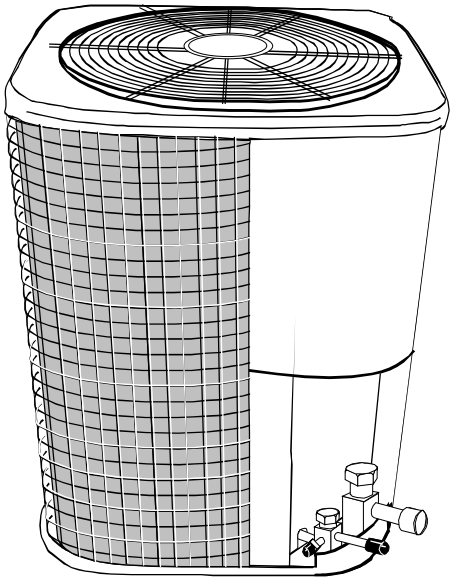

**RECOGNIZE THIS SYMBOL AS A SAFETY PRECAUTION.**

## ATTENTION INSTALLING PERSONNEL

As a professional installer you have an obligation to know the product better than the customer. This includes all safety precautions and related items.

Prior to actual installation, thoroughly familiarize yourself with this Instruction Manual. Pay special attention to all safety warnings. Often during installation or repair it is possible to place yourself in a position which is more hazardous than when the unit is in operation.

Remember, it is your responsibility to install the product safely and to know it well enough to be able to instruct a customer in its safe use.

Safety is a matter of common sense...a matter of thinking before acting. Most dealers have a list of specific good safety practices...follow them.

The precautions listed in this Installation Manual are intended as supplemental to existing practices. However, if there is a direct conflict between existing practices and the content of this manual, the precautions listed here take precedence.


**Amana**
**1810 Wilson Parkway • Fayetteville, TN 37334**

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# SAFETY GUIDELINES

1. Allow only qualified, experienced technicians to install or service this unit.
2. Install the system in accordance with all local codes. If no local codes exist, follow National Codes (NEC in the U.S., CEC in Canada).
3. Open the electrical disconnect switch before electrically connecting the unit.
4. Before operating the unit, be certain it is properly grounded.
5. The unit contains refrigerant gas under pressure. Avoid puncturing or breaking any tubing.
6. Before operating the unit, complete the refrigerant connections.

# GENERAL

This manual covers only the installation of the remote heat pump. For information on accessories, see the unit "Specification Sheet".

### *SHIPPING AND HANDLING*

Check the unit for any shipping damage. If damage is found, contact the company where you purchased the unit. If no damage is found, carefully remove all shipping material, and properly dispose of it.

Keep the unit as upright as possible. Laying the unit on its side or top could cause equipment damage.

### *LOCATION AND CLEARANCES*

This unit is for outdoor installation only. Refer to Figure 1 for clearances from the sides of the unit to full walls and other objects.

**NOTE:** This unit cannot be completely enclosed. At least one side must be unrestricted.

Minimum clearances are required to avoid air recirculation and keep the unit operating at peak efficiency. A minimum six inch clearance is required on one side of the unit, and a minimum of twelve on two other sides. The remaining side of the unit must be unrestricted. Ensure that there is at least five feet clearance above the unit. These minimum clearances do not guarantee adequate service access. Sufficient clearances for servicing the unit(s) must be provided.

If installing two or more units at the same location, allow at least 24 inches between the units when using the 6"-12"-12" guidelines in Figure 1. The space between two units may be reduced to 12" if the clearances in Figure 1 are increased to 12"-24"-24".

**MINIMUM CLEARANCES**

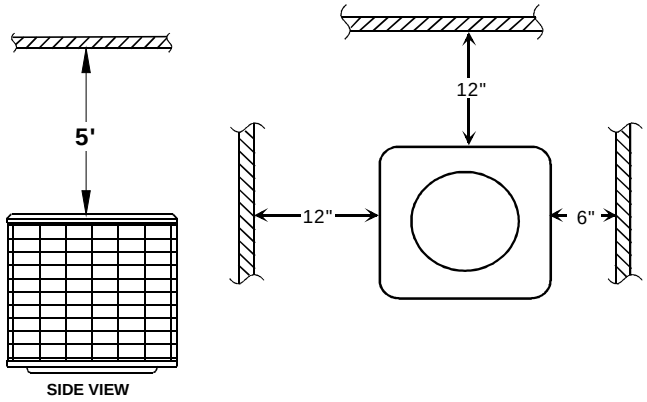



**Figure 1**

DO NOT locate the unit:

- Directly under a vent termination for a gas appliance.
- Within 3 feet of a clothes drier vent.
- Where the refreezing of defrost water would create a hazard.
- Where water may rise into the unit.

DO locate the unit:

- With the bottom of the unit at least three inches above the maximum expected snow accumulation level.
- In accordance with the minimum clearances described Figure 1.
- To minimize the length of refrigerant piping required.
- To provide adequate service clearances.
- On a level concrete pad (or other sturdy, weather resistant platform).
- Isolated from the building structure to avoid transmission of vibrations.

In general, short runs of refrigerant piping are better than long runs. Fifty feet is the longest line set allowed with Amana split system heat pumps.

Locate the unit to provide safe access for future maintenance and service. If possible, discuss unit location with the owner before proceeding.

### *ROOFTOP INSTALLATIONS ONLY*

Place the unit on a level, weather resistant platform. Be sure the roof will support the weight of the unit and platform. For approximate unit weight, see the "Specification Sheet". If in doubt about the adequacy of the roof, it is your responsibility to contact a qualified architect or structural engineer before installing the unit.

### *APPLICATION NOTE*

For proper performance, the indoor equipment and ductwork must be adequate for moving about 400 CFM of indoor air for every ton of cooling capacity to be installed. If they are not, modify the ductwork or indoor equipment accordingly.

## I. Refrigerant Piping

***REFRIGERANT LINE SIZING***

See unit "Specification Sheet" for required line sizes. Be sure to use the correct size as using smaller vapor lines can decrease unit performance. These sizes are suitable for line lengths of fifty feet or less. It also assumes that the indoor coil will not be more than forty feet above or below the outdoor unit. Longer runs and greater lifts are not recommended.

***ROUTING OF REFRIGERANT LINES***

All of the vapor line must be insulated. The insulation must include a vapor barrier.

The liquid line must be outside of the vapor line's insulation.

If part of the liquid line must run through an area that will be hotter than 120°F, then that portion of the liquid line must be insulated.

Avoid burying refrigerant lines. If you must bury them, first dig the trench so that it gradually slopes toward the compressor (at least 1 inch per 10 feet). Then, insulate the liquid and suction lines separately. Enclose all underground portions of the refrigerant lines in waterproof material (conduit or pipe). If the lines must pass under or through a concrete slab, be sure they are adequately protected.

Seal the holes where the refrigerant piping enters the building.

Be careful not to kink or dent the refrigerant lines. Kinked or dented lines will cause poor performance or compressor damage.

***FILTER DRIER INSTALLATION***

1. A filter drier must always be installed with a new outdoor unit for the compressor warranty to be in effect.
2. Units are shipped with a bi-flow liquid line filter drier and it must be installed in the liquid line either near the outdoor unit or near the indoor coil.
3. A bi-flow filter drier equivalent to a Sporlan HPC-163-S-HH is recommended for clean up after a compressor burnout.

***SWEAT CONNECTIONS AT THE UNIT***

**IMPORTANT**: To avoid overheating of the service valve while brazing, wrap the valve body with a wet rag, or use a thermal heat trap compound as recommended by the compound manufacturer.

1. The ends of the refrigerant lines must be cut square, deburred, cleaned, and be round and free from nicks or dents. Any other condition increases the chance of a refrigerant leak.
2. After brazing, quench the joints with water or a wet cloth. This will also help prevent overheating of the service valve.
3. The paint finish of a filter drier must remain intact after brazing. Repaint or treat with rust preventative, if paint is chipped or burned.

***SWEAT CONNECTIONS AT THE INDOOR COIL***

Check the indoor coil liquid and vapor line diameter. A bushing or coupling may be needed to match the line sizes used. If mix matching to a restrictor orifice indoor coil, check the "Specification Sheet" for the proper orifice size to be used with this outdoor unit.

## II. Safe Refrigerant Handling

**WARNING**

**To avoid possible explosion, death, or injury; practice safe handling of refrigerants.**

While these items will not cover every conceivable situation, they should serve as a useful guide:

Refrigerants are heavier than air. They can "push out" the oxygen in your lungs or in any enclosed space. To avoid possible death or difficulty in breathing:

- Never sniff refrigerant.
- Never purge refrigerant into an enclosed room or space. In fact, all refrigerants must, by law, be reclaimed.
- If an indoor leak is suspected, thoroughly ventilate the area before beginning work.
- Liquid refrigerant can be very cold. To avoid possible frostbite or blindness, avoid contact and wear gloves and goggles. If liquid refrigerant does contact your skin or eyes, get medical help immediately.
- Always follow Environmental Protection Agency (EPA) regulations. Never burn refrigerant, as poisonous gas will be produced.

To avoid a possible explosion, use refrigerant cylinders properly:

- If you must heat a cylinder for faster charging, partly immerse it in warm water. Never apply flame or steam to the cylinder.
- Store cylinders in a cool, dry place. Never use a cylinder as a platform or a roller.
- Never add anything other than R-22 to an R-22 cylinder.
- Never fill a cylinder more than 80% full of liquid refrigerant.
- When removing refrigerant from a system, use only returnable (not disposable) service cylinders. Check the cylinder for its pressure rating and hydrostatic test date. Check the cylinder for any damage which may lead to a leak or explosion. If in doubt, do not use the cylinder.

***LEAK TESTING***

**WARNING**

**To avoid the risk of fire or explosion, never use oxygen, high pressure air or flammable gasses for leak testing of a refrigeration system.**

1. Be sure both hand valves on the gauge manifold are closed relative to the center port (i.e., turned in all the way.) Attach this gauge manifold to the service valves on the unit. Do not open the unit service valves. Do not use refrigerant from the unit for leak testing - it has been precisely measured at the factory for optimum performance.

**WARNING**

**To avoid possible explosion, the line from the nitrogen cylinder must include a pressure regulator and a pressure relief valve. The pressure relief valve must be set to open at no more than 150 psig.**

2. Connect a cylinder of dry nitrogen to the center port on the gauge manifold.
3. Open the hand valve a minimal amount on the line coming from the nitrogen cylinder.
4. Open the high pressure valve on the manifold gauge. Pressurize the refrigerant lines and the indoor coil to 150 psig (1034 kPA). To reach 150 psig, you may need to further open the hand valve on the nitrogen cylinder. Once 150 psig has been reached, close the valve on the nitrogen cylinder and disconnect it from the manifold gauge.

**WARNING**

**To avoid possible explosion or equipment damage, do not exceed 150 psig when pressure testing.**

5. Place a soapy solution on all connections and joints and check for bubbles. If bubbles are seen, you have a leak. Mark these locations.

   **NOTE:** If you plan to use an electronic leak detector, add a trace of R-22 to the system (if permitted by current EPA regulations).

6. Using the manifold gauge, carefully release the nitrogen from the system. Check for leaks. If leaks are found, repair them and repeat steps 1 through 6. If no leaks are found, proceed to system evacuation.

***SYSTEM EVACUATION***

**NOTE:** Evacuate the indoor (ID) coil and line sets prior to releasing charge from the outdoor (OD) unit into the system.

1. Connect the vacuum pump, high vacuum manifold set, thermocouple vacuum gauge and charging cylinder as shown in Figure 2. Be sure all valves are fully closed.
2. Confirm proper pump and gauge operation. Open the shutoff valve leading to the vacuum pump (C). Start the pump. When the gauge manifold (low side) reading drops to about 29 inches of vacuum, open the valve to the thermocouple vacuum gauge (D). Continue evacuation until the gauge reads 250 microns or less.

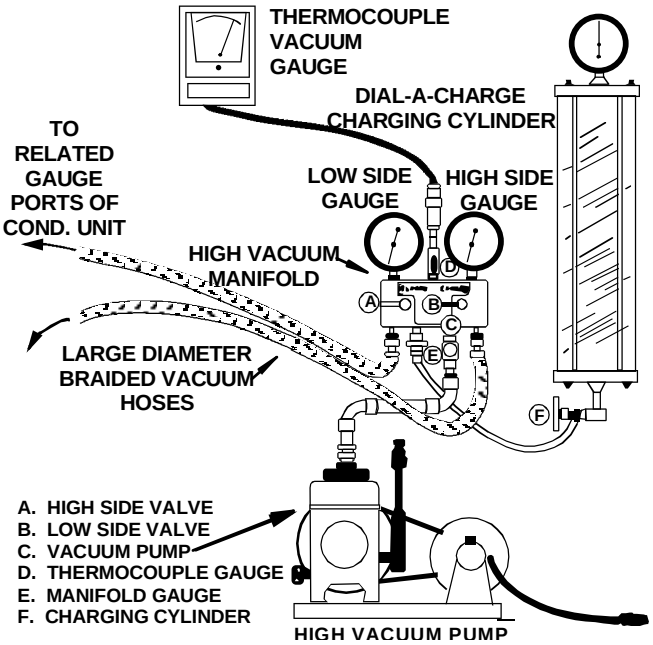



**Figure 2**

3. To avoid potential gauge damage due to "pegging the meter", close the valve to the thermocouple vacuum gauge (D).
4. Open the high side (B) and low (A) side valves on the manifold gauge. Keeping the valve on the charging cylinder closed (F), open the valve on the manifold gauge (E) leading to the cylinder.
5. Evacuate the system to about 29 inches of vacuum as measured by the manifold gauge (low side).
6. Open the valve to the thermocouple vacuum gauge (D) and evacuate until the gauge reads 250 microns or less.
7. Close the valve to the vacuum pump. Wait five minutes, then check the pressure on the thermocouple vacuum gauge:
   a. If the pressure is not more than 1500 microns, the system is leak-free and properly evacuated. Proceed to Step 8.
   b. If the pressure rises, but holds at about 5000 microns, moisture and noncondensables are still present. Open the valve to the vacuum pump, and go back to Step 6.
   c. If the pressure rises above 5000 microns, a leak is present. Repeat Section II, *Leak Testing*.
8. Close the valve to the thermocouple vacuum gauge. Close the valve to the vacuum pump. Shut off the pump.

# III. Electrical Connections

| MAXIMUM ALLOWABLE WIRE LENGTH IN FEET TO LIMIT VOLTAGE DROP TO 2% | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WIRE SIZE (AWG) | MINIMUM CIRCUIT AMPACITY OF OUTDOOR UNIT (MCA) | | | | | | | | | | | | |
| | 10 | 12.5 | 15 | 17.5 | 20 | 22.5 | 25 | 27.5 | 30 | 32.5 | 35 | 37.5 | 40 |
| 14 | 75 | 60 | 50 | 43 | 37 | N/R | N/R | N/R | N/R | N/R | N/R | N/R | N/R |
| 12 | 118 | 95 | 79 | 68 | 59 | 53 | 47 | N/R | N/R | N/R | N/R | N/R | N/R |
| 10 | 188 | 150 | 125 | 107 | 95 | 83 | 75 | 68 | 63 | 58 | 54 | N/R | N/R |
| 8 | 301 | 241 | 201 | 172 | 150 | 134 | 120 | 109 | 100 | 93 | 86 | 80 | 75 |
| 6 | 471 | 376 | 314 | 269 | 235 | 209 | 188 | 171 | 157 | 145 | 134 | 125 | 118 |

N/R = NOT RECOMMENDED

Wire ampacity and voltage drop calculation based on copper conductors with 75 degree C insulation per 1996 National Electrical Code (NEC) Conductors in 86 degree F ambient.
See NEC for ampacity derating for higher ambients.

**Table 1**

**NOTE: This table is provided as a guide only. Wire sizing may be regulated by local codes. Local inspection is the final authority on wire sizing.**

**WARNING**

**To avoid personal injury, shock, or death, open the electrical disconnect switch before electrically connecting the unit. Wiring must conform with National Electrical Code (NEC) or Canadian Electrical Code (CEC) and all local codes.**

The wiring diagram for this unit can be found on the control box cover. Refer to Figure 3 for field wiring connections.

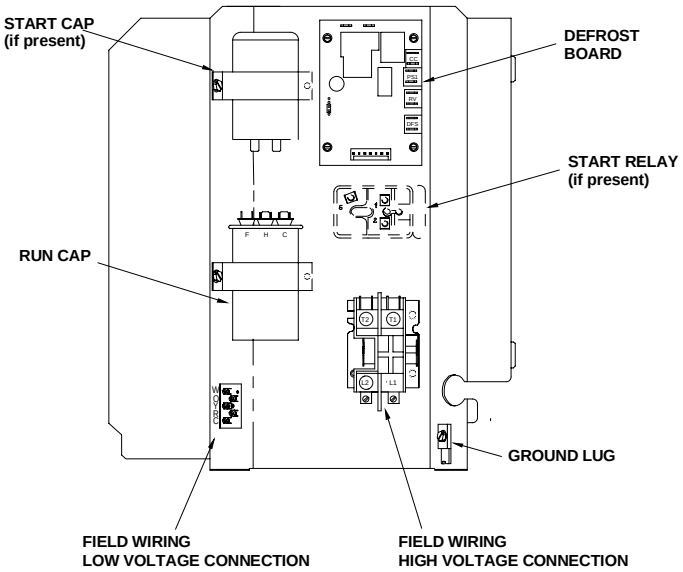



**Figure 3**

**WARNING**

**To avoid the risk of fire or equipment damage, use only copper conductors.**

**WARNING**

**Undersized wires can cause poor equipment performance, equipment damage, or fire. Consult the NEC, CEC or a qualified electrician for proper wire size.**

**NOTE:** Local codes usually require that a disconnect switch be located near the unit. Do not locate the disconnect switch on the unit itself.

**WARNING**

**To avoid personal injury, shock, or death, be sure wiring to the unit is properly grounded.**

1. Wire size is important to ensure proper unit operation. Wire size must be sufficient to carry the minimum circuit ampacity listed on the unit serial data plate. We recommend sizing the wires to limit the voltage drop to a maximum of 2% from the main breaker or fuse panel to the outdoor unit. Use Table 1 as a guide for wire gauge and length of run.
2. Route the power supply and ground wires through the high voltage entrance in the unit. Connect the power supply wires to the contactor. Connect the ground wire to the ground lug.
3. Route the low voltage wiring through the low voltage entrance in the unit. Connect the low voltage wires to the terminal strip.
4. If an Amana approved room thermostat is not already present, install one at a suitable indoor location. Consult the instructions packaged with the thermostat for

mounting and location instructions. For field-supplied low voltage wiring and connections, see the last section of this manual.

**IMPORTANT:** Hard start components are required when single-phase reciprocating compressors are used with indoor coils which have thermal expansion valves. Some units have hard start components factory installed. See the "Specification Sheet" for hard start component requirements.

5. Check all factory wiring connections to ensure none were loosened during shipping and handling.

## IV. System Start-up

***PRELIMINARY CHARGE ADJUSTMENT***

**IMPORTANT:** If this unit has a crankcase heater (see the wiring diagram or "Specification Sheet" shipped with unit), connect electrical power to the unit for four hours before operating the compressor. Failure to do so could result in compressor damage.

**IMPORTANT**: During all installation and service work, follow all regulations of the EPA. This system uses refrigerant R-22. R-22 is an HCFC (HydroChloro-FluoroCarbon). It is a violation of EPA regulations to discharge HCFC into the atmosphere doing so may result in fines or other penalties.

After completing system piping, leak testing,and electrical connecting, use an allen wrench to carefully open the suction and liquid valves on the unit. These valves do not back seat.

**⚠ WARNING**

**To avoid personal injury or death, open each valve only until it touches the retainer. To avoid loss of refrigerant, do not apply pressure to the retainer.**

The outdoor unit is factory charged with enough R-22 for the matching indoor blower coil or matching A coil plus 25 feet of 3/8 inch liquid line. Add or subtract 0.60 oz. of R-22 per foot of 3/8" liquid line for any difference from 25 feet. For line sets over 50 feet consult an Amana distributor.

**IMPORTANT:** Use only refrigerant which is certified to meet ARI Standard 700. Used refrigerant may cause compressor damage, and will void the warranty. (Most portable machines cannot clean used refrigerant well enough to meet this ARI Standard.)

**IMPORTANT**: If adding refrigerant to a system, add only refrigerant vapor (not liquid) through the suction valve (low side) on the outdoor unit. Any other practice may cause compressor damage.

***FINAL CHARGE ADJUSTMENT - COOLING OPERATION***

Final charge adjustment must be performed when the outdoor temperature is 60°F or higher:

1. Set the room thermostat to "COOL".
2. Set the fan switch to "AUTO".
3. Set the temperature control well below room temperature.
4. Turn the power on.
5. Let the system run for 15 - 20 minutes, or until pressures are stabilized.
6. Measure the high side pressure from the liquid line service valve port.
7. Measure the low side pressure from vapor line service valve port (for superheat value at outdoor unit).

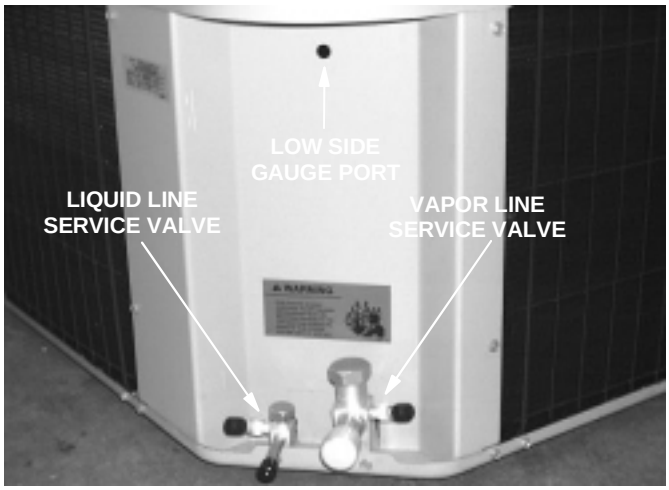



**Figure 4**

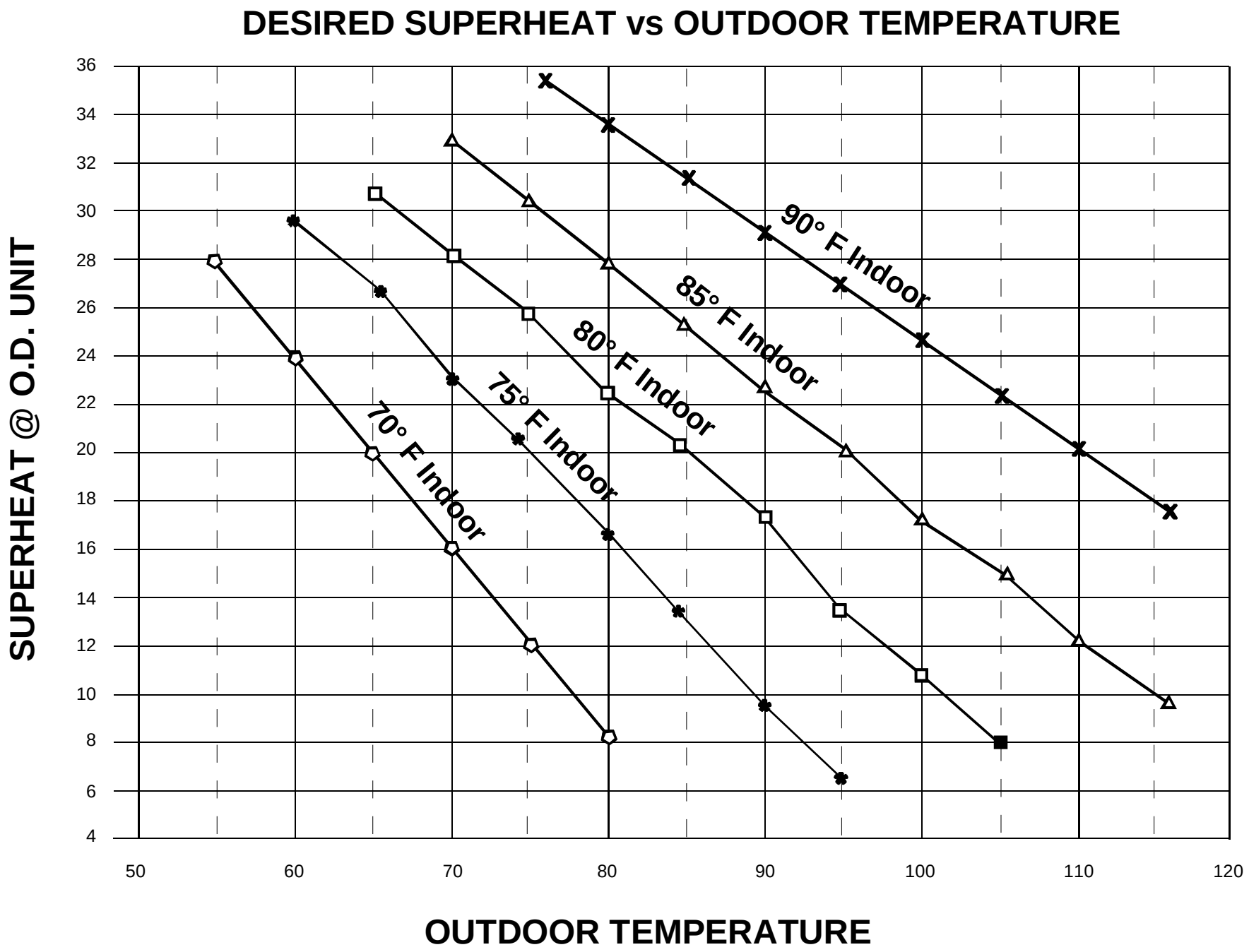
***ID COIL WITH EXPANSION VALVE:***

At stabilized cooling conditions and with an outdoor temperature of 60°F or higher, the system should have from 9°F to 13°F subcooling at the outdoor unit liquid line service valve. If you have less than 9°F subcooling, add charge. If you have more than 13°F subcooling, remove charge.

***ID COIL WITH ORIFICE:***

For a proper superheat reading, measure the refrigerant pressure and temperature at the outdoor unit vapor line service valve. The superheat should be within 3°F of that shown on the chart on page 8. If the superheat is higher, add charge. If the superheat is lower, remove charge.

**EXAMPLE**: The low side pressure is 84 psi. The low side temperature is 80°F. The outdoor temperature is 95°F. The indoor temperature is 85°F. By referring to a pressure temperature chart, you will see that 84 psi equals a saturated temperature of 50°F. The superheat is 80 - 50 = 30°F. The chart shows a superheat of 20°F is ideal for these conditions. Since our superheat is 30 - 20 = 10°F higher than ideal, charge must be added.


DESIRED SUPERHEAT vs OUTDOOR TEMPERATURE
SUPERHEAT @ O.D. UNIT
OUTDOOR TEMPERATURE
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
50
60
70
80
90
100
110
120
90° F Indoor
85° F Indoor
80° F Indoor
75° F Indoor
70° F Indoor

Operating pressures and current draw can also be compared with the data given in the “Specification Sheet”. If the system is performing properly, reinstall the service port caps and the valve bonnets. With the valve opened, the valve bonnet is the primary seal against refrigerant leaks. See the table below for the torque required for an effective seal on the valve bonnet (1/6 turn past finger tight).

| Tubing Size | Torque (Foot-Pounds) |
|---|---|
| 3/8 | 10 |
| 1/2, 5/8, 3/4 | 14 |
| 7/8, 1 1/8 | 16 |

After closing the valve bonnet, perform a final refrigerant leak test on the valves and sweat connections. Return the room thermostat to the desired settings.

***TROUBLESHOOTING***
***(QUALIFIED SERVICE TECHNICIAN ONLY)***

When troubleshooting, the first step should always be to check for clean coils, clean filter(s), and proper airflow. Indoor airflow should be 350 to 450 CFM per ton of cooling, based on the size of the outdoor unit. The most common way of establishing indoor airflow is heating temperature rise. Indoor airflow will then be (Heating output of equipment) / (1.1 x temp. rise). In other cases, measurement of external static pressure is helpful. For details, see the Installation Manual for your indoor equipment.

If further information is needed, see the Remote Heat Pump Service Manual.

## V. Defrost System

The RHA**B2A models are equipped with a time temperature type defrost board. Defrosting of the OD coil is determined by both coil temperature and compressor run time. See the “Specification Sheet” for factory settings. Adjustment can be changed as required. There are 30, 60, and 90 minute settings available. Adjust only if geographical conditions, outdoor humidity, or other adverse conditions make it necessary.

**DEFROST TIME ADJUSTMENT PIN**

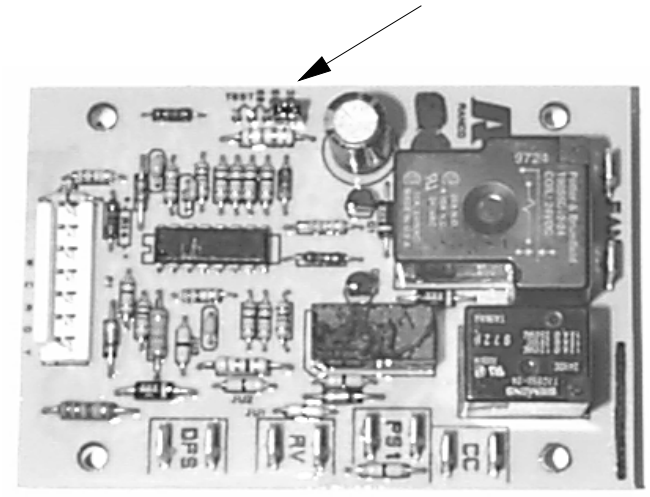


**Figure 5**

**NOTE:** If the time select pin remains in test position for 5 minutes, the control will ignore test mode and assume a normal 90 minute defrost cycle. To over ride this time out, remove the select pin briefly and replace back on test.

**WARNING**

**To avoid electrical shock or death, disconnect the power before changing the defrost time cycle.**

If adjustment of the run time appears advisable:

1. Disconnect power to OD unit.
2. Move the defrost time adjustment pin from 90 minutes to 60 minutes or 30 minutes as required (refer to Figure 5).
3. Reconnect the electrical power.

The maximum defrost time is 14 minutes. Most defrost cycles are shorter.

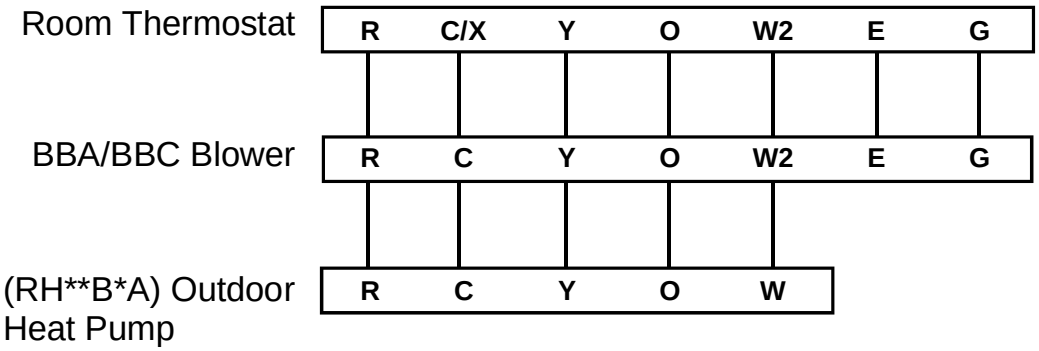
**SERVICING**: When servicing, it may be necessary to rapidly advance the system through a defrost cycle. To do this:

Place the defrost time adjustment pin on Test. When the unit starts the defrost cycle, quickly remove the time select pin to allow normal defrosting and defrost termination to proceed. The select pin may be reconnected to test or repeat the defrost cycle, or the pin may be placed in the desired time setting. (Jumping both test pins with a small insulated screw driver will also work.)

**WARNING**

**To avoid electrical shock or death, disconnect the electrical power before servicing.**

# THERMOSTAT* CONNECTIONS TO RH-HEAT PUMPS
## WITH INDOOR BBA/BBC BLOWER COIL




**Approved Thermostats:** 10636701, 10636702, 10636703, D9945804, D9807605

**NOTE:** 1. When installing accessories, wiring may have to be modified. Follow the instructions in the accessory kit's installation instructions.

2. For thermostat models D9945804 and D9807605, jumper **Y** and **W1** at the thermostat.

**WARNING**

**To avoid personal injury, shock or death, disconnect the electrical power before electrically connecting any equipment or changing any existing wiring.**

# System Checklist

| | | |
|---|---|---|
| | 1 | Does the condenser fan blade rotate freely, and is it tight on the shaft? |
| | 2 | Does the refrigerant tubing flex freely and not touch another tube to cause rub through? |
| | 3 | Are both indoor and outdoor sections level? |
| | 4 | Are the units properly supported? |
| | 5 | Is outdoor section properly located on concrete base or equivalent? |
| | 6 | Are the refrigerant lines correctly installed according to the relative position of the outdoor and indoor sections? |
| | 7 | Is the refrigerant tubing properly supported by isolation hangers? |
| | 8 | Is the system completely free of refrigerant leaks? |
| | 9 | Has the system been properly evacuated? |
| | 10 | Does the system have the correct refrigerant charge? |
| | 11 | Is the outdoor unit protected by the correct size time delay type fuses or breakers in the indoor power box? |
| | 12 | Are the power supply wires to units the correct size? |
| | 13 | Are all electrical connections tight? |
| | 14 | Does the compressor sound normal? |
| | 15 | Check the amperage on the indoor blower motor. Is it within the limits shown on the nameplate of the motor? |
| | 16 | Are all access panels installed and secured? |
| | 17 | Do controls function properly? Are manual reset switches in the reset position (high pressure cutouts, relays, etc.)? |
| | 18 | Check the voltage with unit running. Does it check within the tolerance of 207 to 253V for 230V, or 198 to 228V? If using 208V power indoors, have you modified the transformer wiring as necessary? |
| | 19 | Has the air flow across the indoor coil been checked and adjusted? |
| | 20 | Has the air distribution system been balanced? Are all grilles, diffusers, and dampers properly adjusted and locked? |
| | 21 | Has the system operated at least 30 minutes before leaving the job? |
| | 22 | Does the owner understand the operation of the unit and the thermostat? |
| | 23 | Does the owner know where the filters are located? |
| | 24 | Does the owner know when and how the filter(s) should be cleaned or changed? |
| | 25 | Have the registration cards been filled out and mailed? |
| | 26 | Does the owner know whom to call for service? |
| | 27 | Has the User's Guide been filled out and left with the owner? |